

Trapping furbearers: an overview of the biological and social issues surrounding a public policy controversy

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The foothold trap is an important and traditional wildlife management tool (Boggess et al. 1990). Foothold traps comprised about 61% of the traps owned by trappers in the United States during 1992 (International Association of Fish and Wildlife Agencies Fur Resources Committee 1993). An estimated 300,000 licensed trappers harvested \$121 million of fur in the United States during 1987 (International Association of Fish and Wildlife Agencies Fur Resources Committee 1993), which resulted in a total economic impact of \$810.8 million (Southwick Associates, Arlington, Va., unpublished report, 1993). In Canada, about 51,000 trappers (N. Jotham, Canadian Wildlife Service, Ottawa, Ont., personal communication) harvested \$26 million of fur (Statistics Canada 1996) during 1994–95. Many trappers, especially aboriginals in Canada, use furbearers for food (Todd and Boggess 1987). Of 61 North American jurisdictions, 80% referred nuisance furbearer complaints to trappers (Williams and McKegg 1987), and about 63% of trappers have been contacted to trap problem animals (International Association of Fish and Wildlife Agencies Fur Resources Committee 1993). Foothold traps have been used extensively

by the U.S. Department of Agriculture's Wildlife Services program, accounting for 9% of 89,213 coyotes (*Canis latrans*) taken in the United States during 1995 (M. Mendoza, U. S. Department of Agriculture, APHIS, Wildlife Services, Riverdale, Md., personal communication), usually to resolve livestock depredation complaints. Foothold traps also have been used to remove coyotes, red foxes (*Vulpes vulpes*), and other predators to enhance survival of endangered San Joaquin kit foxes (*V. macrotis*; Cypher and Scrivner 1992), California least terns (*Sterna antillarum*; Butchko 1990), and waterfowl (Anthony et al. 1991, Lokemoen and Woodward 1993), as well as to capture endangered species such as gray wolves (*C. lupus*) and red wolves (*C. rufus*) for research and relocation. Additionally, foothold traps are a valuable method for capturing furbearers for research purposes.

Despite these apparent wildlife management benefits, trapping has been controversial at times during this century (Feldman 1996). Numerous attempts, at the local, state, and national levels, have been made to ban trapping; however, most have failed (Gentile 1987). Recent ballot initiatives to ban or limit trapping in Arizona (1994), Colorado (1996), Massachusetts

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Table 1. Frequency of foot injuries to coyotes captured in 8 types of restraining devices during Denver Wildlife Research Center studies.

Injury	Points scored ^f	Sterling MJ600 ^{®a} (n=68) ^d %	No. 3 North woods laminated ^a (n=59) %	Victor 3NM ^{®b} (n=33) %	Heim-brook Special ^b (n=30) %	Soft Catch ^{®c} standard (n=53) %	Soft Catch modified ^c (n=60) %	No. 31/2 E-Z Grip ^{®a} (n=65) %	Belisle foot snare ^b (n=30) %
Edematous swelling or hemorrhage ^g	5-15	94	95	100	100	96	95	97	100
Cutaneous laceration <2 cm	5	45	58	45	63	60	62	20	17
Cutaneous laceration >2 cm	10	47	25	45	33	23	12	11	7
Minor periosteal abrasion	10	70	78	48	53	23	25	3	7
Minor subcutaneous soft tissue maceration or erosion	10	26	54	0	47	6	2	2	0
Minor tendon or ligament severance	25	63	46	52	70	13	17	6	0
Amputation of 1 digit	25	1	0	0	0	0	0	2	3
Major subcutaneous soft tissue maceration or erosion	30	9	8	0	6	0	0	3	0
Joint luxation below carpus or tarsus	30	19	13	39	17	24	7	6	0
Major periosteal abrasion	30	26	39	12	13	0	2	2	10
Major laceration on foot pads	30	6	0	0	10	6	2	8	3
Simple fracture at or below (distal to) carpus or tarsus	50	1	0	0	0	0	2	0	0
Amputation of 2 digits	50	0	0	0	0	2	0	0	0
Amputation of 3 or more digits	100	1	0	0	0	0	0	0	0
Amputation above digits	100	1	0	0	0	0	0	0	0
Joint luxation above carpus or tarsus	100	0	0	0	0	2	0	2	0
Major tendon or ligament severance	100	0	0	0	0	2	0	0	0
Compound or simple comminuted fracture above carpus or tarsus	100	0	2	0	0	0	0	2	0
Compound or comminuted fracture at or below carpus or tarsus	100	9	2	0	3	2	0	2	0

^a From Phillips et al. (1996).

^b From R. L. Phillips (Unpublished data).

^c From Gruver et al. (1996). No. 3 Soft Catch[®] standard=No. 3 Soft Catch[®] trap with standard factory coil springs and a clamping force of 2.1 kg/cm². No. 3 Soft Catch[®] modified=No. 3 Soft Catch[®] trap with 4 coil springs and a clamping force of 3.6 kg/cm².

^d Sample size for injury calculations.

^e Each injury category was considered separately and a coyote may be represented in more than 1 row. Total percent exceeds 100.

^f Injury points were added to obtain mean and median injury scores in Table 2.

^g Mild=5 points, moderate=10 points, and major=15 points.

(1996), and California (1998); recent state surveys in Arizona (Behavior Research Center, Inc., Phoenix, Ariz., unpublished report, 1993), Colorado (Fulton et al. 1995), and Illinois (Duda and Young 1994); and national surveys (Arthur 1981, Kellert 1981, Reiter et al. 1995) indicate that most citizens do not support trapping.

In 1991, the European Council passed Regulation Number 3254/91, which prohibited use of foothold traps in the 12 countries (currently 15 countries) of the European Union as of January 1995. This regulation also prohibited importation of pelts and manufactured goods from 13 furbearer species originating in countries where harvesting with foothold

traps was allowed or using trapping methods not meeting "internationally agreed humane trapping standards." Agreement was not reached on an international trap standard; thus the regulation was scheduled to ban importation of fur products from the United States and other countries using foothold traps starting in December 1997. Canada, Russia, and the European Community signed an "Agreement on International Humane Trapping Standards between Canada, the European Community and the Russian Federation" in 1997 and 1998. On 18 December 1997 the United States and the European Community signed an "Agreed Minute," a non-binding understanding to be implemented through trapping-related Best Management Practices. Both agreements are intended to improve the welfare of captured animals, thus allowing the continued importation of fur products into Europe.

We review the biological and social issues surrounding the furbearer trapping controversy and present recommendations to manage those issues. We focus on foothold traps because most public concern has been directed at foothold traps. We also focus on coyotes because most foothold trap research has been conducted on that species, and, at least in the western United States, coyotes have been at the center of controversy over predator management.

The issues

The trapping controversy has been evolving since at least the turn of the century (Gentile 1987). Biological and social developments have contributed to this evolution.

Injuries and animal welfare concerns

Several professional wildlife biologists have emphasized the need to minimize injury and pain inflicted on animals by trapping (Payne 1980, Schmidt and Bruner 1981, Proulx and Barrett 1989). When wildlife agencies and professional wildlife managers allow animals to endure unnecessary injury and pain, they lend credence and strength to charges by animal welfare and animal rights advocates that wildlife management professionals are insensitive and unresponsive to animal welfare issues (Schmidt and Bruner 1981, Decker and Brown 1987).

Humane yet effective traps are available for capture of some carnivores. Standard steel-jawed foothold traps cause significant measurable injuries to captured coyotes (Olsen et al. 1986, 1988; Onderka et al. 1990; Phillips et al. 1992) and other species (Olsen

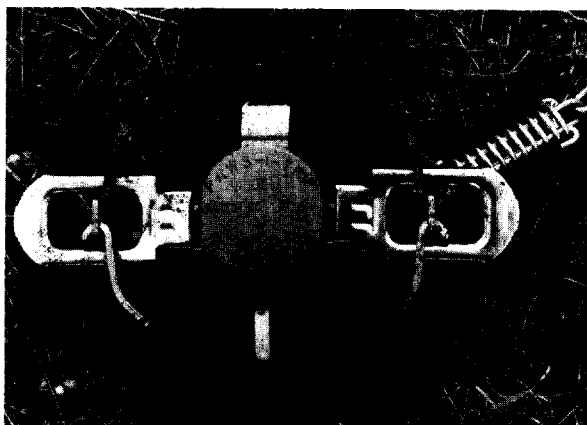


Figure 1. Number 3 Soft Catch® trap modified with additional springs and Paws-I-Trip™ pan tension device (M-Y Enterprises, Homer City, Pa.) decreases injuries to coyotes compared to unpadded steel-jaw foothold traps (Gruver et al. 1996) and excludes most small non-target animals that step on the pans of traps (Phillips and Gruver 1996).

et al. 1986, 1988). Padded-jaw foothold traps, such as the Soft Catch® (Woodstream Corporation, Lititz, Pa.) and E-Z Grip® (Livestock Protection Company, Alpine, Tex.) (mention of commercial products does not constitute endorsement by the authors or the federal government), compared to standard and thick-jaw (laminated) steel traps, significantly reduce foot injuries to captured coyotes (Tables 1, 2; Olsen et al. 1986, 1988; Onderka et al. 1990; Linhart and Dasch 1992; Phillips et al. 1992, 1996) and other species (Olsen et al. 1986, 1988; Kreeger et al. 1990; Kern et al. 1994). Kreeger et al. (1990) found that padded traps caused less trauma than unpadded traps to red foxes. Padded traps have been available since 1984; however, they comprised only 3% of foothold traps owned by trappers in the United States during 1992 (International Association of Fish and Wildlife Agencies Fur Resources Committee 1993). The slow adoption of Soft Catch traps probably was influenced by low capture efficiency of early models (Linscombe and Wright 1988). Also, raccoons (*Procyon lotor*) sustained significantly fewer injuries when captured in the EGG® trap compared to the Number 1 Victor® coil spring trap (Hubert et al. 1996).

The most common foot injury to coyotes and red foxes captured in padded foothold traps is edema (Table 1), and these animals, if released, recover within a few days (Saunders and Rowsell 1984). Freezing may occur less frequently in limbs of coyotes caught in padded traps (47% of 21 limbs) than those caught in unpadded traps (72% of 22 limbs; Onderka et al. 1990).

We believe reduced foot injuries sustained by coyotes and other animals captured in padded, compared to unpadded, traps is attributable to the padded jaws rather than the weaker springs on an earlier version of Soft Catch traps. Coyotes captured in Number 3 Soft Catch® traps, modified with stronger or additional coil springs (Figure 1) or in the larger Number 3 1/2 E-Z Grip® trap, sustained significantly fewer or similar foot injuries compared to coyotes captured in Soft Catch traps with standard and weaker coil springs (Tables 1, 2; Linhart et al. 1988, Gruver et al. 1996, Phillips et al. 1996). However, many animal welfare and animal rights organizations oppose padded traps (Stevens 1992) because foot, leg, and tooth injuries are not completely eliminated and even padded traps may be painful.

Trap check intervals and injuries

Opponents of trapping express concerns about lack of food and water and the stress endured by animals in traps. Boggess and Henderson (1981) and the Fur Institute of Canada (1989) recommended that all live-holding devices set on land should be checked daily. Using smaller traps (Novak 1987, Saunders et al. 1988, Warburton 1992) and daily or almost daily (1.4 days), early-morning trap checks (Novak 1987, Saunders et al. 1988, Proulx et al. 1994) have reduced injuries to trapped animals. In the United States during 1995, 33 states required that land-set traps must be checked every 24 hours or daily, but trap-check intervals were unlimited in 4 states (International Association of Fish and Wildlife Agencies Fur Resources Technical Subcommittee 1995).

Humaneness and capture efficiency

Foothold traps and trapping techniques developed to be more humane or selective should be comparable in capture efficiency (i.e., number of animals caught/unit of effort) to standard traps if they are to be acceptable to trappers (Novak 1987, Naylor and Novak 1994). However, even if more humane traps are not as efficient, trappers may

have to use them to satisfy public concerns about the humane treatment of animals (Proulx and Barrett 1989). An early model of the Soft Catch trap had lower rates of capturing coyotes (Linhart et al. 1986, 1988; Linscombe and Wright 1988), bobcats (*Lynx rufus*), and red foxes (Linscombe and Wright 1988) than standard traps, but capture rates for red foxes were similar in another study (Tullar 1984). Newer and improved Number 3 Victor Soft-Catch® traps, when properly set, were as efficient as unpadded traps in capturing coyotes (Table 2; Skinner and Todd 1990, Linhart and Dasch 1992, Phillips et al. 1992, Phillips and Mullis 1996).

During wet conditions, Soft Catch traps may be less efficient than steel foothold traps for capturing red foxes (Kern et al. 1994), but Phillips and Mullis (1996) reported that the Number 3 Soft Catch® trap was as effective as unpadded traps for capturing coyotes under a variety of operational trapping conditions. The latest version of Soft Catch traps recently (1997) has been manufactured with stronger springs (C. E. Tully, Woodstream Corporation, Lititz, Pa., personal communication), which may increase capture efficiency during wet conditions (Houben et al. 1993); additional springs also may increase efficiency (Gruver et al. 1996). Efficiency of padded traps improved as trappers gained experience in using them (Skinner and Todd 1990).

Capture selectivity

Trap selectivity depends not only on the mechanical attributes of a trap but also on where and how

Table 2. Mean and median injury scores and capture rates for 8 coyote restraining devices during Denver Wildlife Research Center studies.

Trap type	Test states ^a	n ^a	Injury Score		Capture rate (%)
			Mean	Median	
Sterling MJ600® ^b	Calif., Tex., Id.	68	103.3	80.0	94
No. 3 Northwoods® laminated ^b	Calif., Tex., Id.	59	79.3	80.0	95
Victor 3NM® ^c	Tex.	33	66.3	60.0	95
Heimbrock Special ^c	Calif., Tex.	30	80.5	80.0	94
No. 3 Soft Catch® standard ^d	Calif.	53	43.5	15.0	95
No. 3 Soft Catch® modified ^d	Calif.	60	26.2	15.0	97
No. 3 1/2 E-Z Grip® ^b	Calif., Tex., Colo.	65	29.0	10.0	88
Belisle foot snare ^c	Tex.	30	19.7	10.0	64

^a Test states, test dates, and sample sizes for data on injury scores.

^b From Phillips et al. (1996), and R. L. Phillips (Unpublished data).

^c From R. L. Phillips (Unpublished data).

^d From Gruver et al. (1996), and R. L. Phillips (Unpublished data). No. 3 Soft Catch® standard=No. 3 Soft Catch® trap with standard factory coil springs and a clamping force of 2.1 kg/cm². No. 3 Soft Catch® modified=No. 3 Soft Catch® trap with 4 coil springs and a clamping force of 3.6 kg/cm².

the trap is set, factors influenced by the knowledge and skill of a trapper. Properly set traps can effectively capture specific depredating animals (Gipson 1975, Andelt and Gipson 1979) and permit release of non-target animals.

Novak (1987) summarized >25 studies reporting 0 to >2 non-target animals captured/target animal. Trap selectivity for large species, such as coyotes, can be increased significantly by attaching a pan tension device (Figure 1), which increases the weight (generally 1.4–1.8 kg for coyote traps) required to fire the trap, thus excluding small animals (Turkowski et al. 1984, Butchko 1990, Phillips et al. 1992, Phillips and Gruver 1996). Traps modified with pan tension devices excluded 92–100% (Turkowski et al. 1984) and 97% of 826 (Phillips and Gruver 1996) small non-target animals, whereas unmodified traps excluded only 6% (Turkowski et al. 1984). Other methods that may reduce capture rates of non-target animals include setting traps >8 m from carcasses (Hein and Andelt 1994), using appropriate and selective baits and lures (Andelt and Woolley 1996), covering baits in dirt-hole sets, setting traps away from residences and hiking trails, and not setting traps when the probability of capturing non-targets is high. Disadvantages of padded traps and pan-tension devices include higher purchase prices, the cost of replacing standard traps, the possible costs of modifying some new padded traps by attaching pan tension devices, the occasional need to replace worn or chewed rubber pads, and the additional training required to use these new traps effectively.

Public opinion and trapping

The public-at-large has limited knowledge of trapping (Behavior Research Center, Inc., Phoenix, Ariz., unpublished report, 1993; Duda and Young 1994). Only 22–42% of survey respondents indicated they supported trapping (Missouri Department of Conservation 1992; Behavior Research Center, Inc., Phoenix, Ariz., unpublished report, 1993; Duda and Young 1994; Fulton et al. 1995). This lack of support is underscored by a 1994 ballot initiative in Arizona that banned use of most traps for most purposes on public lands by a margin of 59 to 41%; a 1996 ballot initiative in Colorado that banned foothold traps, body-gripping traps, and snares (with a few exceptions) by a margin of 52 to 48%; and 1996 and 1998 ballot initiatives in Massachusetts and California that banned most traps for most purposes by margins of 64 to 36%, and 57.5 to 42.5%, respectively.

The public seems concerned primarily about humane treatment of animals (avoidance of pain and suffering), secondarily about specificity (extent to which only target animals are captured), and least concerned about the cost of control (and presumably trapping) methods (Arthur 1981). Trapping is perceived to cause more pain and suffering than other methods and is judged one of the least acceptable methods to control coyotes (Arthur 1981). In general, the public has negative attitudes toward traps and considers them inhumane (Kellert 1981; Galloway Vigil and Associates 1986; Behavior Research Center, Inc., Phoenix, Ariz., unpublished report, 1993; Reiter et al. 1995).

Public approval of trapping also depends on the reason for trapping. In 2 surveys—one in 1995 in Colorado (Fulton et al. 1995) and one in 1994 in Illinois (Duda and Young 1994)—only 9 and 15% of respondents, respectively, approved of trapping for recreation, whereas 13 and 27%, respectively, approved of trapping to obtain money. However, 69% of respondents in Colorado and 71% in Illinois approved of trapping to protect livestock and property, and 87% of the Colorado respondents supported trapping to prevent the spread of disease.

More than 80% of Colorado adults surveyed indicated that wildlife and trapping laws should be rewritten to ensure that pain and suffering to wildlife were minimized (Fulton et al. 1995). Those respondents (33%) who opposed trapping in Illinois indicated that they would be more likely to find trapping acceptable if daily trap checks and limited trap sizes were legal requirements (they are, in fact, in Illinois), and if certain types of traps were prohibited to ensure that trapping was conducted as humanely as possible given current technology (Duda and Young 1994). Thirty-one percent of the respondents indicated that knowing that seasons were structured in the fall and winter to avoid capture or abandonment of young would make them more inclined to find trapping acceptable. Given these results, we believe the public would be more likely to support padded-jaw traps and other improvements to traps which reduce injuries.

Ballot initiatives are frequently used by small groups exploiting mass media to affect voting and to usurp agency or legislative decisions on wildlife management issues (Minnis 1998). In 1996, the public voted on wildlife policy issues in Alaska, California, Colorado, Idaho, Massachusetts, Michigan, Oregon, and Washington. These policy issues were debated in forums rich in propaganda but often lacking informed debate. For exam-

ple, proponents of the referendum in Massachusetts showed television footage of 6 or 7 different animals that were captured in traps or sets already prohibited by wildlife regulations (T.A. Decker, Agency of Natural Resources, St. Johnsbury, Vt., personal communication). Decisions in these ballot initiatives were arrived at largely by appeal to emotions, beliefs, and values, not through reasoned analyses. Thus, each time the public overturns existing wildlife policy by popular referendum, the wildlife management environment becomes ever more polarized, intractable, and unpredictable.

Progress in improving trapping systems

Despite, or perhaps because of, hostility in the political environment surrounding the trapping controversy, steady progress is being made to improve the humaneness and effectiveness of trapping devices, methods, and practices.

Canada

Since the 1950s, Canada has worked aggressively to improve the humaneness of trapping systems by supporting trap-testing research on numerous furbearers (Barrett et al. 1988). A trap-testing facility is maintained near Vegreville, Alberta, where 10 more-humane killing traps and 1 more-humane restraining device have been developed (L. D. Roy, Alberta Environmental Center, Vegreville, Alta., personal communication). Canada was instrumental in attempting to establish international trap standards through the International Organization for Standardization (ISO), in Geneva, Switzerland (Proulx and Barrett 1989). The Canadian General Standards Board's Committee on Development of Humane Trapping Standards approved a national standard for killing traps in 1984 (Canadian General Standards Board 1984) and in 1996 (Canadian General Standards Board 1996) and is working on standards for restraining and submersion trapping, which are expected to be completed before the end of 1999 (L. D. Roy, Alberta Environmental Center, Vegreville, Alta., personal communication). During 1997 and 1998, Canada, Russia, and the European Community signed an agreement on international humane trapping standards.

United States

Most trap research conducted in the United States has evaluated restraining traps for coyotes (Linhart et al. 1986, 1988; Linscombe and Wright 1988, Olsen et al. 1988, Phillips et al. 1992, 1996; Hubert et al.

1997), red foxes (Tullar 1984, Kreeger et al. 1990, Kern et al. 1994), and raccoons (Tullar 1984, Olsen et al. 1988, Hubert et al. 1996). The United States and the European Community signed an Agreed Minute in 1997 that is intended to identify and incorporate the use of more-humane traps and trapping methods, and recognizes that authority to regulate trapping resides primarily in state and tribal authorities. The Fur Resources Technical Subcommittee of the International Association of Fish and Wildlife Agencies (IAFWA), which represents state fish and wildlife agencies, participated in the ISO process to develop standards for trapping, helped negotiate the Agreed Minute, has compiled data on trap research, has identified priority species and trapping systems for additional work, is coordinating a trap-testing program throughout the United States, and is compiling Best Management Practices for trapping (International Association of Fish and Wildlife Agencies Fur Resources Technical Subcommittee 1997).

New Zealand

Research has been conducted in New Zealand to determine efficiency and degree of injuries sustained by Australian brushtail possums (*Trichosurus vulpecula*) in various foothold traps and killing effectiveness of body-gripping traps (Warburton 1982, 1992). New Zealand recently has used these findings and ISO draft trap standards to develop a "code of practice" for trapping possums that is intended to be incorporated into its animal-welfare legislation (N. Jotham, Canadian Wildlife Service, Ottawa, Ont., personal communication).

International Organization for Standardization

In 1986, the ISO established Technical Committee 191 with a mandate to develop international standards for humane mammal traps. Approximately 10



Figure 2. Foothold traps are often used to capture coyotes. Photo by W. F. Andelt

years later, participating countries could not agree on performance requirements for a trap standard. However, ISO Technical Committee 191 developed an international standard for trap testing (ISO TC191 1998) that was to have received final vote in 1998. This standard, as well as a standard scoring system for injuries, is needed to compare research results.

Future challenges

Adopting research findings

Numerous scientific publications indicate padded foothold traps reduce foot injuries to several furbearer species, yet padded traps were required by law in only 7 states (Ariz., Calif., Colo., Ill., La., Mass., Tenn.) for some species and under some conditions during 1995 (International Association of Fish and Wildlife Agencies Fur Resources Technical Subcommittee 1995, T. A. Decker, Agency of Natural Resources, St. Johnsbury, Vt. and G. F. Hubert, Illinois Department of Natural Resources, Hinckley, Ill., personal communication). The National Trappers Association has taken an active role in the ISO process, in developing Best Management Practices and sponsoring Best Management Practices workshops. Wildlife managers should consider incentives such as reduced license fees, trap "buy-back" programs, and expanded opportunities for trappers that incorporate the latest devices and techniques. Ultimately, new devices and techniques promoting humane and selective capture of animals should be incorporated in Best Management Practices, or in national or international standards, and in regulatory changes that indicate to the public that real changes have been made and will continue to be made. Without adopting new research-based findings, we believe that trappers and wildlife managers will be confronted with increased critical public scrutiny.

Best Management Practices

The Fur Resources Technical Subcommittee of the IAFWA, in cooperation with the National Trappers Association, is developing Best Management Practices, which will be a set of regional recommendations for use by individual state wildlife agencies and trapper organizations to improve the welfare of several species of captured furbearers by selecting traps and trapping methodologies that cause the fewest injuries under various trapping conditions and are selective, efficient, practical, and safe for the user (International Association of Fish and Wildlife Agencies Fur Resources Technical Subcommittee

1997). We encourage all state wildlife agencies and trapper organizations to adopt these forthcoming practices and incorporate them into trapper education and furbearer management programs to indicate to the public that they are serious about improving the welfare of trapped animals. Adopting these practices may circumvent engaging in lengthy development of a state's own standards when attempting to resolve conflicts between trappers and other interests.

Trapping regulations and public desires

States generally manage wildlife within their borders, with wildlife held in trust for their citizens (Musgrave and Stein 1993). We believe it is essential for states and other jurisdictions to adopt trapping regulations that meet the expectations of the majority of citizens, with those expectations tempered by professional judgment. While wildlife management should not be subjected to a popularity contest, neither should it be conducted outside the consent of interested and affected citizens. Otherwise, agencies will lose credibility in managing wildlife and we will likely see a continued proliferation of ballot initiatives in which voters make uninformed wildlife management decisions independently from wildlife professionals.

The public appears more supportive of trapping when it is limited and regulated (Behavior Research Center, Inc., Phoenix, Ariz., unpublished report, 1993). Most Missourians (71%) approved of trapping when it was defined as regulated (Missouri Department of Conservation 1996), but only 42% approved when it was not so defined (Missouri Department of Conservation 1992).

Research needs

Research on foothold traps has concentrated on reducing injuries to the restrained feet of animals and improving the selectivity and efficiency of traps. Although this research has focused primarily on coyotes, and secondarily on raccoons and red foxes, additional research is needed on other furbearer species. Todd (1987) described a method of prioritizing furbearer species for research and development of humane capture methods based upon "stress" of capture methods, size of the harvest, human preference for the species, and other factors. During 1998 the Fur Resources Technical Subcommittee of the IAFWA was to have conducted 8 studies in 17 states, using 8 species and 28 types of traps, to determine the effect of various improvements and modifications to traps on efficiency, selectivity, and injuries (D.A. Hamilton,

Missouri Department of Conservation, Columbia, Mo., personal communication). Where traps are used to capture animals that cause damage, research should focus on how to selectively capture specific target animals.

Foot snares have been used to capture black bears (*Ursus americanus*) (Johnson and Pelton 1980, Beck 1991), mountain lions (*Puma concolor*; Lindzey 1987), coyotes, and other furbearers by the foot or leg. Foot injuries to coyotes captured in Belisle foot snares (Edouard Belisle, 3269 Chemin Lac Klamika, Ste-Veronique, PQ, Canada J0W 1X0) have been similar to those captured in Number 3 Victor Soft Catch traps (Tables 1, 2), but foot snares have had lower capture rates than foothold traps (Table 2; Skinner and Todd 1990, Mowat et al. 1994). We believe foot snares such as the Belisle, E-Z Lee, Fremont, Godwin, and Nelson have potential to humanely capture and restrain coyotes and other furbearers, but additional research and development are needed to improve their utility, practicality, and capture efficiency (Table 2).

Cage traps have been used to capture pine marten (*Martes americana*; deVos and Guenther 1952), muskrats (*Ondatra zibethicus*; Proulx and Gilbert 1983), mountain lions (Neighbor et al. 1991), black bears (T.D.I. Beck, Colorado Division of Wildlife, Dolores, Colo., personal communication), and wolverines (*Gulo gulo*; Copeland et al. 1995) with few injuries, but these traps rarely capture coyotes. Additional research is needed to determine practicality, capture efficiency, and public acceptance of cage traps.

Needs of individual states and provinces

Trapping standards may need to vary among states. For example, in cold northern areas, foot snares might be preferable to padded foothold traps because foot snares appear to have less potential for freezing the feet of lynx (*Lynx lynx*; Mowat et al. 1994) and possibly other species. In some northern areas where furbearer densities are low and frequent trap-check intervals are not practical, it may be necessary to use killing-type traps instead of footholding devices (Proulx et al. 1994).

Need for trapper training

Several authors have emphasized the need for trapper education courses to enhance adoption of more-humane and selective trapping devices (Payne 1980, Proulx and Barrett 1989, Boggess et al. 1990, Siemer et al. 1994). Most Arizona residents (76%) (Behavior Research Center, Inc., Phoenix, Ariz., unpublished report, 1993), trappers across the United

States (72%) (Kellert 1981), and trappers responding to a survey (56%) in *Trapper Magazine* (Boddicker 1981) indicated that trappers should complete a trapper education course. These programs are needed to ensure proper use of existing devices and incorporation and acceptance of new devices and techniques. The delay in adopting padded traps suggests that considerable educational efforts are needed before trappers will adopt padded traps and other trapping improvements. To enhance adoption of padded traps, we suggest educational programs that incorporate: (1) the assistance of respected trappers who have successfully used padded traps, (2) discussions of public expectations for humane capture of furbearers, (3) discussions of the public image of trappers who adopt the most humane capture devices and techniques compared to those who do not, and (4) possibly field demonstrations and videos that show the proper use and capture effectiveness of padded traps. States will be incorporating the forthcoming Best Management Practices into their trapper education programs.

Public education

The public tends to be poorly informed about trapping issues (Boggess et al. 1990, Proulx and Barrett 1991, Duda and Young 1994, Fulton et al. 1995). In Arizona, 8% of residents indicated that they were strong supporters of trapping and 54% were firm opposers, whereas 38% indicated that their attitudes toward trapping were not strongly fixed and were open to change (Behavior Research Center, Inc., Phoenix, Ariz., unpublished report, 1993). Thus, additional information may change the opinion of only a minority of the public. However, opposition to trapping decreased with increased knowledge of trapping issues (Behavior Research Center, Inc., Phoenix, Ariz., unpublished report, 1993; Duda and Young 1994). Education that provides objective and accurate information is needed so that the public can make informed decisions (Boggess et al. 1990). The Fur Resources Technical Subcommittee of the IAFWA is initiating a public education program as part of the Best Management Practices on trapping (International Association of Fish and Wildlife Agencies Fur Resources Technical Subcommittee 1997).

Public acceptance of trapping likely will be highest if wildlife managers provide educational information that emphasizes current regulations that minimize injuries and trauma in animals, promote selective capture, avoid seasons when females have dependent young, emphasize that it is illegal to trap

threatened and endangered species, and emphasize publicly acceptable reasons for trapping, such as minimizing economic damage (see also Behavior Research Center, Inc., Phoenix, Ariz., unpublished report, 1993; Duda and Young 1994; Fulton et al. 1995). A public communication program that clearly explained trapping policies and their rationale would be helpful (Fulton et al. 1995). The overall goal of a public education program should be to obtain informed consent for trapping, not to convince the public that animals feel good in traps.

Public beliefs and attitudes toward trapping appear rooted in values about wildlife welfare, wildlife rights, and wildlife uses (Fulton et al. 1995). People's basic value and belief structures are far more intractable than most wildlife professionals want to believe (Fulton et al. 1996). The most promising way to educate a limited portion of the public about the complexities of public policy issues appears to be through public involvement processes that assign significant power to the participants (Stout et al. 1996). When members of the public directly engage one another in the resolution of public issues of mutual concern, knowledge of issues, tolerance for competing values and viewpoints, flexibility, adaptability, and creative problem solving are all enhanced (Barber 1984, Dryzek 1990, Yankelovich 1991, Manning 1993).

Economic factors

The IAFWA Fur Resources Committee (1993) reported that trappers across the United States spent an average of \$1,126 each for traps, lures, travel expenses, other trap-related equipment, and major equipment purchases in the 1991-92 season. Number 1 1/2 and Number 3 Soft Catch traps cost about \$110 and \$150/dozen, respectively, approximately 50% more than standard steel foothold traps. Costs might be reduced by manufacturing padded jaws that could be used to retrofit existing standard traps and by phasing in padded traps over a period of time.

Managing the controversy

Wildlife managers are entrusted by the public to be stewards of publicly owned wildlife resources (Kania and Conover 1991). Regardless of funding sources, professional wildlife managers dealing with public resources should understand and represent many of the myriad values of the public or at least conduct activities that are within the public's informed consent. Traditionally, wildlife managers

have focused on biological aspects of wildlife management, but now they are paying closer attention to the sociological and political aspects. Peterson and Manfredi (1993) contend that social science must be elevated to a higher level of emphasis within wildlife management to meet the challenges of the 21st century and beyond. Wildlife managers must establish and maintain impeccable professional standards to treat the people's wildlife humanely and ethically to avoid the loss of public credibility and trust (Schmidt 1992).

Wildlife managers should continue to endorse traps and trapping as a wildlife management activity. In doing so, they should be concerned with: (1) developing, scientifically evaluating, manufacturing, and implementing more humane and selective traps; (2) adopting minimum trap-check intervals that reduce animal injuries; (3) setting harvest seasons to avoid periods when females have dependent young; and (4) focusing on the need to trap where public tolerance and acceptance are high, such as instances of safeguarding public health and safety, managing wildlife damage, and protecting endangered wildlife species and habitats. We need to develop and implement standards nationally and internationally to demonstrate dramatically and publicly the commitment of the wildlife profession to ethical and humane practices consistent with widespread public wildlife values. Lastly, we need better forums for concerned members of the public, the trapping community, and wildlife managers to debate and resolve concerns over trapping.

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Missouri Department of Conservation, Columbia, Mo., personal communication). Where traps are used to capture animals that cause damage, research should focus on how to selectively capture specific target animals.

Foot snares have been used to capture black bears (*Ursus americanus*) (Johnson and Pelton 1980, Beck 1991), mountain lions (*Puma concolor*; Lindzey 1987), coyotes, and other furbearers by the foot or leg. Foot injuries to coyotes captured in Belisle foot snares (Edouard Belisle, 3269 Chemin Lac Klamika, Ste-Veronique, PQ, Canada J0W 1X0) have been similar to those captured in Number 3 Victor Soft Catch traps (Tables 1, 2), but foot snares have had lower capture rates than foothold traps (Table 2; Skinner and Todd 1990, Mowat et al. 1994). We believe foot snares such as the Belisle, E-Z Lee, Fremont, Godwin, and Nelson have potential to humanely capture and restrain coyotes and other furbearers, but additional research and development are needed to improve their utility, practicality, and capture efficiency (Table 2).

Cage traps have been used to capture pine marten (*Martes americana*; deVos and Guenther 1952), muskrats (*Ondatra zibethicus*; Proulx and Gilbert 1983), mountain lions (Neighbor et al. 1991), black bears (T.D.I. Beck, Colorado Division of Wildlife, Dolores, Colo., personal communication), and wolverines (*Gulo gulo*; Copeland et al. 1995) with few injuries, but these traps rarely capture coyotes. Additional research is needed to determine practicality, capture efficiency, and public acceptance of cage traps.

Needs of individual states and provinces

Trapping standards may need to vary among states. For example, in cold northern areas, foot snares might be preferable to padded foothold traps because foot snares appear to have less potential for freezing the feet of lynx (*Lynx lynx*; Mowat et al. 1994) and possibly other species. In some northern areas where furbearer densities are low and frequent trap-check intervals are not practical, it may be necessary to use killing-type traps instead of footholding devices (Proulx et al. 1994).

Need for trapper training

Several authors have emphasized the need for trapper education courses to enhance adoption of more-humane and selective trapping devices (Payne 1980, Proulx and Barrett 1989, Boggess et al. 1990, Siemer et al. 1994). Most Arizona residents (76%) (Behavior Research Center, Inc., Phoenix, Ariz., unpublished report, 1993), trappers across the United

States (72%) (Kellert 1981), and trappers responding to a survey (56%) in *Trapper Magazine* (Boddicker 1981) indicated that trappers should complete a trapper education course. These programs are needed to ensure proper use of existing devices and incorporation and acceptance of new devices and techniques. The delay in adopting padded traps suggests that considerable educational efforts are needed before trappers will adopt padded traps and other trapping improvements. To enhance adoption of padded traps, we suggest educational programs that incorporate: (1) the assistance of respected trappers who have successfully used padded traps, (2) discussions of public expectations for humane capture of furbearers, (3) discussions of the public image of trappers who adopt the most humane capture devices and techniques compared to those who do not, and (4) possibly field demonstrations and videos that show the proper use and capture effectiveness of padded traps. States will be incorporating the forthcoming Best Management Practices into their trapper education programs.

Public education

The public tends to be poorly informed about trapping issues (Boggess et al. 1990, Proulx and Barrett 1991, Duda and Young 1994, Fulton et al. 1995). In Arizona, 8% of residents indicated that they were strong supporters of trapping and 54% were firm opposers, whereas 38% indicated that their attitudes toward trapping were not strongly fixed and were open to change (Behavior Research Center, Inc., Phoenix, Ariz., unpublished report, 1993). Thus, additional information may change the opinion of only a minority of the public. However, opposition to trapping decreased with increased knowledge of trapping issues (Behavior Research Center, Inc., Phoenix, Ariz., unpublished report, 1993; Duda and Young 1994). Education that provides objective and accurate information is needed so that the public can make informed decisions (Boggess et al. 1990). The Fur Resources Technical Subcommittee of the IAFWA is initiating a public education program as part of the Best Management Practices on trapping (International Association of Fish and Wildlife Agencies Fur Resources Technical Subcommittee 1997).

Public acceptance of trapping likely will be highest if wildlife managers provide educational information that emphasizes current regulations that minimize injuries and trauma in animals, promote selective capture, avoid seasons when females have dependent young, emphasize that it is illegal to trap